Future Research

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Chapter 9. Future Research

A. Introduction

Successful operation of IFDM systems requires a good understanding of irrigation water management, crop management, salt management, drainage system management, operation of a solar evaporator, and selection of crops and plant materials. Information is available to the operator on most of these topics, but nothing is static and crops change, irrigation systems evolve, and new practices are being developed for the integrated management of irrigation and drainage systems. The ultimate disposal of saline drainage water in a solar evaporator and the disposal of salt products still require extensive research. The fate of contaminants in the soil water and plant continuum is not well defined and requires additional study.

A listing of the research projects funded by Prop. 204 money from the California Department of Water Resources and State and Federal funds from the U.C. Center for Water Resources demonstrates that the areas of concern indicated above are currently being researched. Results from these studies will have application to the operation of IFDM systems in the future. More information can be obtained from the DWR and UCR websites, respectively: http://www.sjd.water.ca.gov/drainage/prop204/index.cfm; and http://www.waterresources.ucr.edu/index.php?content=sdp/research/researchSD.html.

B. Examples of Funded Research Projects

1) Drainage Water Reuse

Drainage Water Irrigation Monitoring for an Integrated on-Farm Drainage Management Component at Red Rock Ranch, Fresno County

Monitoring Wildlife Impacts at IFDM Demonstration Projects

Development of Wildlife Management Criteria for the Operations of IFDM Projects

Using Forages and Livestock to Manage Drainage Water in the San Joaquin Valley

Crop Production with In-situ Use of Shallow Saline Groundwater-Reuse of Drainage Water, and Active Drainage System Management

Suitability Assessment of Salt-Tolerant Forages and a Halophyte for Sequential Drainage Water Reuse Systems: Plant Water Use (ET), Forage Quality, and Productivity

Feasibility Determination and Design of a Wintering Waterfowl Wetland Habitat Using a Low-Selenium Saline Agricultural Drainage Water Supply

Characterization and Utilization of Saline Biomass

Developing Biofuel and Selenium-Enriched Forage from Canola Irrigated With Selenium-Laden Drainage Waters on the Westside of Central California

Greenhouse Evaluation of Salt-Tolerant Forages Growing in Red Rock Ranch

Animal Evaluation of Salt-Tolerant Forages Irrigated With Saline Drainage Water: Forage Quality, Persistence Under Grazing, Digestibility and Intake by Animal

2) Salt Separation and Utilization

Water and Salt Recovery by Solar Distillation

Investigate and Evaluate Alternative Systems of Salt Separation, Purification, Utilization, or Disposal

Salt Utilization in Glass Making

Phase I: Application and Feasibility of Salinity Gradient Solar Pond Technology in the San Joaquin Valley. Phase II: California Salt Gradient Solar Pond in the San Joaquin Valley

Feasibility Pilot Demonstration for Producing Commercial Salt Products from Saline Subsurface Drainage Water Using the Ion Exchange Process

3) Drainage Water Treatment

Grassland Drainage Area Algal-Bacterial Selenium Removal Facility

Removal of Selenium from Drainage Water in Lined Reduction and Open Oxidation Channels: A Field Study

Reducing Selenium Loads and Ecotoxic Risk in IFDM Systems Using Solar Evaporation Basins that Combine Invertebrate Harvest with Algal Volatilization of Selenium

Critical Process Requirements for Membrane Desalination of Agricultural Drainage Water at Selected Locations in the San Joaquin Valley

4) Source Reduction

Impacts of Drainage Re-Use on Water District Salinity Budgets: A Case Study of Two Westside Irrigation Water Districts

An Economic Analysis of Solar Evaporators and Evaporation Ponds

U.C. Center for Water Resources

5) Salinity/Drainage Projects

Interaction of Se Biogeochemistry with Foodchain Disruption in Full-Scale Evaporation Basins

Selenium Removal from Agricultural Drainage Water by Selenate-Reducing Bacteria

Does Saline Drainage Water Affect Crop Tolerance to Boron?

Integrated Drain Water Management in the Central Valley

Phytoremediation of Selenium-Contained Drainage Sediments and Chemical Characterization of Potentially Exotoxic Se Forms